



Office of Energy Efficiency
and Renewable Energy



Low-Cost Composite Process

Background

The use of lightweight polymer composites can significantly reduce the weight of cars and trucks, resulting in improved fuel efficiency. A promising method of making large integrated automotive parts is the structural reaction injection molding process. Glass fibers are "preformed" into the shape of the part and then impregnated with a reactive liquid resin in a mold.

With the support of the U.S. Department of Energy's Office of Advanced Automotive Technologies, the Automotive Composites Consortium (ACC), part of the United States Council for Automotive Research (USCAR), is advancing fiber preforming methods. The ACC research is aimed at improving quality and manufacturing speed while reducing costs.

Accomplishments

- ◆ The programmable powdered preforming process (P4), invented by Owens-Corning, is a versatile fiber preforming method. The ACC has brought this process from laboratory feasibility testing to a full-scale demonstration in an automated prototype manufacturing cell located at the National Composites Center in Kettering, Ohio.
- ◆ Working in partnership with Owens-Corning and Aplicator System AB, the ACC has developed a P4 machine capable of producing an entire pickup truck box preform (2 x 1.5 x 0.5 m) in four minutes.
- ◆ The Focal Project II pickup truck box preform is comparable in cost with similar steel structures in current production. The truck box is 25% lighter than steel, is adhesively bonded, and has durability and crashworthiness similar to that of steel structures.
- ◆ Although process development continues, the capabilities of the P4 equipment have drawn the attention of numerous composite manufacturers.



P4 Preformer Making a Pickup Truck Bed

Benefits

- ◆ Use of low-cost structural polymer composites in vehicles will reduce weight, which in turn reduces fuel consumption and emissions, while preserving safety and affordability.

Future Activities

- ◆ Improve manufacturing robustness to allow the commercialization of P4.
- ◆ Extend P4 capability to produce carbon fiber preforms to support high-volume production of ultralightweight composite structures.

Partners in Success

USCAR Automotive Composites Consortium (DaimlerChrysler Corporation, Ford Motor Company, and General Motors Corporation)
Owens-Corning
Aplicator System AB
Textron Automotive
National Composites Center

Contact

Joe Carpenter: (202) 586-1022